

Appl. No. 19/838,070
Amendment Dated July 16, 2003
Reply to Office Action of May 7, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Canceled)
2. (Canceled)
3. (Currently amended) ~~The process of claim 2~~ A process for the catalytic partial oxidation of a hydrocarbon feedstock, comprising:
contacting a feed stream comprising a hydrocarbon feedstock and an oxygen-containing gas feed stream with a monolithic porous metal foam catalyst at conversion-promoting conditions effective to produce an effluent stream comprising carbon monoxide and hydrogen,
wherein the monolithic porous metal foam comprises rhodium and has 75-90% by volume pores and 20-100 pores per inch pore size.
4. (Currently amended) The process of claim 1-3 wherein the catalyst further comprises platinum
5. (Currently amended) The process of claim 1-3 wherein the catalyst is pretreated by exposure to air under conditions sufficient to oxidize the catalyst.
6. (Currently amended) The process of claim 1-3, further comprising preheating said feed stream to a temperature of at least about 30°C.
7. (Original) The process of claim 6 wherein the feed stream is preheated to a temperature between about 50°C and about 700°C.
8. (Original) The process of claim 7 wherein the feed stream is preheated to about 400°C.

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9. (Currently amended) The process of claim 1-3 wherein maintaining the reaction zone further comprises maintaining pressure in said reaction zone between about 500 kPa and about 2800 kPa.

10. (Currently amended) The process of claim 1-3 wherein the molar ratio of methane to oxygen is from about 1.5:1 to about 2.2:1.

11. (Currently amended) The process of claim 1-3 wherein the hydrocarbon feedstock comprises at least about 50% by volume of methane.

12. (Currently amended) The process of claim 1-3 wherein the carbon selectivity for carbon monoxide is at least about 80 %.

13. (Currently amended) The process of claim 1-3 wherein the hydrogen selectivity is at least about 60%.

14. (Currently amended) The process of claim 1-3 wherein contacting the feed stream with the catalyst passing the feed stream over the catalyst at a space velocity from about 150,000 to about 10,000,000 NL/kg/h.

15. (Canceled)

16. (Canceled)

17. (Currently amended) The process of claim 16 A process for the catalytic partial oxidation of a hydrocarbon feedstock, comprising:

contacting a feed stream comprising a hydrocarbon feedstock and an oxygen-containing gas feed stream with a monolithic porous metal foam catalyst at conversion-promoting conditions effective to produce an effluent stream comprising carbon monoxide and hydrogen;

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wherein the monolithic metal foam comprises unsupported rhodium, the foam has 75-90% by volume pores and 20-100 ppi pore size, and the carbon selectivity for carbon monoxide is at least about 80%, and the selectivity for hydrogen is at least about 60%.

18. (Currently amended) The process of claim 15-17 wherein the hydrocarbon feedstock comprises at least about 50 % methane by volume.

19. (Currently amended) The process of claim 15-17 wherein the catalyst further comprises platinum.

20. (Currently amended) The process of claim 15-17 wherein the catalyst is pretreated by exposure to air under conditions sufficient to oxidize the catalyst.

21. (Currently amended) The process of claim 15-17, further comprising preheating said feed stream to a temperature of at least about 30°C.

22. (Original) The process of claim 21 wherein the feed stream is preheated to a temperature between about 50°C and about 700°C.

23. (Original) The process of claim 22 wherein the feed stream is preheated to about 400°C.

24. (Currently amended) The process of claim 15-17 wherein said contacting is carried out at a pressure between about 500 kPa and about 2800 kPa.

25. (Currently amended) The process of claim 15-17 wherein the hydrocarbon feedstock contains methane and the molar ratio of methane to oxygen is from about 1.5:1 to about 2.2:1.

26. (Currently amended) The process of claim 15-17 wherein the hydrocarbon feedstock comprises at least about 50% by volume of methane.

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ad 27. (Currently amended) The process of claim ~~15-17~~ wherein contacting the feed stream with the catalyst comprises passing the feed stream over the catalyst at a space velocity from about 150,000 to about 10,000,000 NL/kg/h.

28. (Canceled)

29. (Canceled)

30. (Currently amended) ~~The process of claim 29A~~ process for the catalytic partial oxidation of a hydrocarbon feedstock comprising:

ad (a) preheating a feed stream comprising a hydrocarbon feedstock and oxygen gas to a temperature between 50°C and 700°C;

(b) passing the feed stream over a catalyst bed comprising a plurality of rhodium metal foam disks, at a space velocity from about 150,000 to about 10,000,000 NL/kg/h at conversion-promoting conditions comprising a pressure from about 500 kPa to about 2800 kPa wherein the conditions are effective to produce an effluent stream comprising carbon monoxide and hydrogen;

wherein the carbon selectivity for carbon monoxide is at least about 80% and the hydrogen selectivity is at least about 60% and wherein the each said foam disk has 75-90% by volume pores and 20-100 ppi pore size.

31. (Currently amended) The process of claim ~~28-30~~ wherein the hydrocarbon feedstock comprises at least about 50 % methane by volume.

32. (Currently amended) The process of claim ~~28-30~~, further including pretreating the catalyst by exposure to air under conditions sufficient to oxidize the catalyst.

33. (Currently amended) The process of claim ~~28-30~~ wherein the feed stream is preheated to about 400°C.

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34. (Currently amended) The process of claim 28-30 wherein the hydrocarbon feedstock contains methane and the molar ratio of methane to oxygen is from about 1.5:1 to about 2.2:1.

35. (Canceled)

36. (Canceled)

37. (Currently amended) A catalyst for the partial oxidation of a hydrocarbon feedstock, comprising:

a porous rhodium foam monolith. The catalyst of claim 35 wherein the foam has comprising 75-90% by volume pores and 20-100 ppi pore size;

wherein the catalyst is capable of oxidizing the hydrocarbon feedstock with a hydrogen selectivity of at least about 60 %.

38. (Currently amended) The catalyst of claim 35-37 wherein the foam has been pretreated by exposure to air under conditions sufficient to oxidize the rhodium.

39. (New) The catalyst of claim 37 prepared by a method comprising impregnating a polyurethane foam disk with an aqueous rhodium suspension, pyrolyzing the polyurethane to provide a rhodium negative of the polyurethane foam, and heat treating the rhodium negative.

40. (New) The catalyst of claim 37 further comprising platinum.

41. (New) The process of claim 3 comprising maintaining catalyst activity for at least 73 days of operation

42. (New) The process of claim 41 comprising using said catalyst for 6 months to 2 years.

43. (New) The process of claim 30 wherein said plurality of disks comprises up to 10 disks.